

Implementing EHRs: An Exploratory Study to Examine Current Practices in Migrating Physician Practice

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Abstract

Implementation of electronic health record (EHR) systems in physician practices is challenging and complex. In the past, physicians had little incentive to move from paper-based records. With the passage of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009, Medicare and Medicaid incentive payments are now available for physicians who implement EHRs for meaningful use. The Office of the National Coordinator for Health Information Technology (ONC) has ample detail on clinical data needed for meaningful use in order to assess the quality of patient care. Details are lacking, however, on how much clinical data, if any, should be transferred from the old paper records during an EHR implementation project. The purpose of this exploratory study was to investigate and document the elements of longitudinal clinical data that are essential for inclusion in the EHR of physicians in a clinical practice setting, as reported by the office managers of the physicians in the study group.

Keywords: electronic health record, clinical data, data migration, HITECH, longitudinal data, medical education

Introduction

The American Recovery and Reinvestment Act (ARRA) of 2009, which includes the Health Information Technology for Economic and Clinical Health (HITECH) Act, established programs under Medicare and Medicaid to provide financial stimulus to physicians for the meaningful use of certified electronic health record (EHR) technology.¹ As a result of the HITECH Act, many physicians have decided to make the move from paper-based records to EHRs. The American Health Information Management Association (AHIMA) practice brief on managing the transition from paper to EHRs notes the complexities of transitioning to an EHR system, the slowness of adoption of EHRs, and concerns for patient safety as top transition issues.² This complexity is due to the number and variety of systems that interface with the EHRs, resistance to change, and the lack of a standard approach for transitioning legacy data to the new system.

The purpose of this exploratory study was to investigate and document the data elements of longitudinal clinical data that are essential for inclusion in the EHR of physicians in a clinical practice setting, as reported by the office managers of the physicians in the study group.

Background

Transitioning from paper-based health records to EHRs is a complicated process on many levels. A river of electronic data flows into these electronic records from diverse sources such as pharmacy, laboratory, radiology, transcription, billing, and electronic document management systems. Software interfaces struggle to map this data into the EHR. Accurate mapping of the data into the new system is vital because EHRs serve as the legal health record containing individually identifiable information describing the healthcare services delivered during a patient's clinic visit. Additional complications occur when paper-based diagnostic results (e.g., lab reports) must be scanned into the new EHR, thus creating a hybrid record system. This situation necessitates cross-referencing in order to locate needed information. Additionally, multiple transcription reports are often retained as well. This complexity makes it difficult to determine what data to migrate and how to validate the accurate, complete migration of the legacy data chosen for migration from the paper-based record to the EHR system.

The AHIMA practice brief notes that any electronic data must also meet the standards set by the Center for Medicare and Medicaid Services (CMS) Conditions of Participation, federal regulations, state laws, and the policies of the facility.³ Other standards of care set by quasi-legal bodies, such as the physician practice group's guidelines or the bylaws of the facility, may also need to be addressed. Examples of federal rules that are mandatory to follow include the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule, enforced by the Office of Civil Rights (OCR), which sets standards for the security of electronic protected health information.⁴ ARRA and HITECH privacy protections further strengthen the HIPAA privacy rules. State laws addressing retention, access, and release of information may also need to be considered if the entire record is not migrated. The AHIMA Practice Brief recommends that the organization establish a legal health record steering committee to manage these issues.

Meaningful use of EHRs is an important migration consideration. In the past, transitioning to EHRs was prohibitively expensive for physicians. EHRs have many benefits, such as the ability to capture structured data as a means to assess the quality of patient care and provide a base for trend analysis. Medicare supports and recognizes the benefits of EHRs in providing quality care and improving outcomes. Medicare and Medicaid EHR incentive programs offer eligible physicians incentive payments to implement certified EHRs and demonstrate meaningful use of them.⁵

Meaningful use is defined as meeting a set of objectives quantified by CMS in predefined measures. The incentive program has three stages. Stage 1 must be met for 90 days in the first year and for the full second year of the practice's participation in the program. The focus of the stage 1 criteria for meaningful use is electronically capturing health information in a coded format, using that information to track key clinical conditions, communicating that information for care coordination purposes, and initiating the reporting of clinical quality measures and public health information. Thus the physician planning the transition, and the steering committee, must be fully cognizant of these requirements and plan accordingly to ensure that meaningful use criteria are met.

Benson⁶ recommends that any vendors selected to assist with the process provide information on the transparency of their solutions for complying with stage 1 meaningful use criteria using certified EHR technology that captures data in a structured format according to CMS and ONC standards. Meeting the certified EHR standards is a requirement for qualifying for the CMS incentive program⁷ and is the cornerstone of providing a secure system. For example, medication reconciliation must be performed for 50 percent of transitions of care, and electronic copies of records must be available within three business days.

The AHIMA Physician Practice Council states that no standard approach exists for transitioning to the new system. The physician and the practice group must decide how to manage their migration from the paper-based record to the EHR. The council emphasizes that data validation is an essential part of data migration, cites the cost of record migration, and recommends a gradual transition to the new system. Physicians must decide how much and which patient data content should be migrated, the method of transferring the data, and how to address storage and retention of old records.⁸ These decisions will vary

by practice, services, space available for storage, and state laws. The physician and other users may be concerned that the new system will not be reliable. Legal health records may need to be redefined to account for the hybrid record system. How to access data for patient visits and ways to limit scanning into the new system must be considered. Practices need to address data quality and consider how far back they want to go with migration of clinical data.

Some standards, such as ASTM International E1384-07(2013), Standard Practice for Content and Structure of the Electronic Health Record, which identifies the content and logical data structure for an EHR, do exist.⁹ Yet publications that provide guidelines or best practices for handling historical clinical data are lacking. In other words, how far back should a physician go to retrieve a patient's historical clinical data in an EHR implementation? Furthermore, which clinical data should be retrieved? Clinical data that might be expected to be part of the data migration include a problem list, past medical history, family history, social history, allergies, lab reports, and medications.

A few studies have examined EHR implementation. A 2008 study examined the use of EHRs in four physician practices in different states that were part of the pay-for-performance Medicare Care Management Performance Demonstration. The study concluded that EHR implementation challenges included managing workflow, selecting data to migrate, and hiring extra staff for data entry.¹⁰ To mitigate the risks associated with implementation, one southern California hospital conducted a risk assessment using SWOT (strengths, weaknesses, threats, opportunities) analysis.¹¹ The primary threats and weaknesses identified included strict timelines to meet CMS stage 1 meaningful use criteria, lack of physician support, and a need for training. Finally, a qualitative analysis of an EHR implementation in an academic ambulatory setting was conducted by interviewing leaders in ambulatory care and other areas who were influential in the implementation decisions.¹² The six themes the leaders identified for a successful implementation were communication, system integration, technical equipment and training, patient privacy, efficiency, and financial considerations.¹³ For example, planning for patient data transfer was identified as a critical step in migrating data.

Migrating longitudinal health data from paper medical records into EHRs in a primary care practice setting is a poorly documented process. Various primary care practice groups import different legacy data sets using different data mappings, data migration tools, and data importing processes. A review of literature yields numerous articles on the content in the EHR, but little mention of how much longitudinal clinical data a physician should bring forward into the new EHR system. This variability in data migration processes makes maintaining data quality problematic, especially with respect to completeness and accuracy of data and ultimately the continuum of care.

The lack of a standard clinical data set that could be tagged for inclusion in an EHR is particularly concerning because the EHR is the foundation of the legal health record and as such is governed by many state and federal statutes. The literature also lacks guidelines for what data elements to transfer to the EHR, offers only incomplete descriptions of methodologies used in the transfer, and lacks information about how much data should be migrated. This study adds to the body of knowledge of methods used by physicians for data migration to EHRs.

Research Questions

The research study investigated the following questions: Which data elements are being migrated into the clinical physician's EHR? What methodologies are utilized to migrate data from the legacy systems into the EHR? How many months of data are migrated for each patient?

Methods

This mixed methods quantitative exploratory study used descriptive analysis to evaluate the results of a survey that was sent to physician practices in Texas that have received government EHR incentive payments as of March 2012. The survey also contained open-ended qualitative questions.

Sample

The data source used for identifying the physicians in the population was downloaded from the CMS website. The data consisted of a comma-delimited file of physician practices in Texas that had received CMS incentive payments as of March 2012. The file included approximately 2,871 entries with data fields that included the physician's name and business address. The authors of this study anticipated that a simple random sample of this population would be obtained for study purposes. To generate the sample, Microsoft Excel was used to assign each of the 2,871 practices a random number. Because several physicians might be listed separately yet belong to the same practice, further data cleaning was done to ensure that the sample contained physicians from distinct practices (i.e., not several from the same practice). A sample size of 1,000 was then selected from the cleaned data. A response rate of 30 percent (300 physicians) was anticipated.

Web-based Survey

Data collection was accomplished with a questionnaire (see Table 1). Specifically, the faculty researchers collaborated with Texas State University's Testing, Research Support, and Evaluation Center (TREC) to design a web-based questionnaire to be delivered using Snap Surveys. Explanatory postcards were sent to 1,000 physician practices on the basis of random-number selection inviting them to participate in the study. The postcards included the survey URL, a QR code, and contact information. The targeted participants in the study were the office managers of the physician practices that had received incentive payments as previously described. Study results were summarized using descriptive statistics to determine if a pattern existed in the number and types of data elements being migrated into the EHR, the number of years of data imported, or the methodology used to import the data. The results of this study were anticipated to serve to help physicians with future EHR implementation projects.

Reliability and Validity

The design of the web-based survey was validated by the statisticians in the Texas State University TREC. The survey was then created by the TREC programmers for pilot testing. Pilot testing was completed by several Texas State University faculty and the Health Information Management Department chair. Slight changes regarding the demographic questions were made, and then the survey was pilot tested again. Additionally, the survey was pilot tested during the Healthcare Information and Management Systems Society (HIMSS) national conference in 2013 by a physician consultant.

Results

Web-based Survey

Respondent demographics ($N = 37$) included 20 physicians, 13 office managers, one nurse, and one respondent each in the job categories of information technology, medical records director, and account manager. The respondent demographics are depicted in Table 2.

Participants were asked the practice's medical specialty (see Figure 1), approximately how many patients the practice sees in a year, and whether the practice migrated the entire health record or certain data elements. (Table 1 lists the questions of the web-based survey.) If the entire health record was not migrated, a list of data items was given and respondent was asked to check off which ones were included in the migration. The list of data elements included the reason for visit/chief complaint, history of present illness, past medical history, medications, allergies, social history, family history, review of systems, physical exam, clinic notes/progress notes, lab results, imaging reports, EKGs, other diagnostics (respondents were asked to specify), and consultation reports. Table 3 depicts specific data elements the respondent could select in the event the entire patient record was not migrated.

Survey results revealed that the two topmost legacy data elements migrated were allergies ($n = 10$) and medications ($n = 10$). Lab results, family history, and past medical history were also frequently selected, with nine respondents selecting each of these data elements. Regarding what methods were used

to migrate the data, two physicians used data entry as the migration methodology, eight scanned the charts, and 23 both typed and scanned data into the new system. (See Table 4.)

Respondents were also asked how far back the physician's practice went for the clinical data migration. Table 5 displays the time frame for which the data were migrated. Sixteen respondents migrated the entire record, one migrated data for patients seen in the last 6 months, one migrated data for patients seen in the last 12 months, three physician practices migrated data for patients seen in the last 18 months, one migrated data for patients seen in the last 24 months, one migrated data for patients seen in the last 36 months, one responded patients seen more than 36 months ago, and eight did point-of-care conversions.

The majority of the respondents performed postmigration data validation by visually examining the records ($n = 20$), two had the vendor validate the data, two used a software editing program, one checked every 15th record, and one did it personally with no method specified.

Respondents were asked how many patients the practice saw per year. Figure 2 shows the responses to this question, which were varied and skewed. The response categories also ranged widely from 500 to 10,000 patients per year. For example, three physicians reported seeing 500 patients a year, while one physician reported seeing 10,000 patients. The categories with the highest frequency were 2,500 and 6,000 patients (six physicians each).

Physicians responded to the qualitative questions regarding the challenges faced when converting to an EHR and having to address the contents of the paper health record. Responses about the biggest challenges during the implementation included the sheer volume of patient health records, purchasing a scanner, organization and time, switching over to the new system, deciding how far back to migrate, and lack of value of scanning historical records.

Discussion

Comments in the survey were varied and informative, and they revealed that many physician practices decided to migrate the patient's entire health record. However, several participants stated that the value of the historical clinical record declines significantly after migration. In addition, data migration challenges mentioned included time, cost, and the functionality of accessing scanned images. Five main data elements of significant value in an EHR system, as determined by response frequency, are allergies, current medications, lab results, past medical history, and family history.

The respondents' comments also indicated the need for better planning ahead of time. Implementing an EHR system is a major project to undertake, and thus significant time must be allotted for project planning. During this phase the need for longitudinal clinical data can be explored and consensus reached by both clinical and administrative staff.

Limitations of the Study

The researchers faced many challenges in conducting this study, such as a reduction in the initial grant amount, data collection challenges, and the low response rate. The grant that funded the study was an internal grant from the Texas State Research Enhancement Program. After the grant was awarded, the amount was immediately reduced because of internal budgetary issues, which necessitated rework and reapproval of the grant budget. This change resulted in a limitation of funds for the postcard mailing. Data collection was a challenge because of the fact that an e-mail address was not a required field in the public data file available from CMS.

Limitations of the study include the low response rate and the fact that all the physician practices were located in Texas as of March 2012. Because of the small sample size, the results may not generalize to other clinical physician practices. Data from another state might yield different results. The number of respondents scanning records into the new system is concerning in that this action immediately violates the definition of a true EHR because scanned data are not structured. Additionally, the resistance to change in the form of the EHR is a factor; it is possible that data through 2014 would have a higher percentage of practices defining a data set for migration and validating data in a more standardized

manner because more of the physicians' peers would have been through the process and be able to provide guidance.

The low response rate was somewhat surprising because the authors had expected these federal incentive recipients to be more receptive to sharing their challenges and insights about the transition from paper to electronic systems. One possible explanation for the low rate is the volume of correspondence that these offices receive. Several respondents did not complete the study, so that questions in the study may have been outside of their knowledge of the process. For example, if the vendor handled the transition, the respondent may not have been able to adequately provide the needed information.

In an effort to increase the response rate, a graduate assistant provided assistance in researching the Internet for published fax numbers of the physician practices. A letter that included the web link for the survey was then faxed. Additionally, an Apple iPad drawing was held as an incentive to answer the survey.

Finally, when the number of responses is considered in the larger context of the practice group, it is possible that many responses were based on the practices for the entire group so that a much larger audience was actually surveyed.

Conclusion

Transitioning to a new EHR system is a complex and challenging process. The process is expensive, even with government incentives, and can be lengthy and disruptive to the practice. Frustrations occur on the part of the staff and the patients as a result of workflow disruptions and the inability to locate full charts. No standard guidelines are available to indicate what data elements to transfer to the EHR, how much data should be transferred, or how to transfer the data. How much data should be migrated also is not clear. Having a standard process in place is essential to ensuring that standards are met for meaningful use, that data integrity is maintained, and that the migrated record meets the definition of a legal health record.

Further research is needed to understand the complexity of the technological and legal issues of this process. Research should be done in other states and other settings such as acute care facilities, nursing homes, public health clinics, and outpatient surgery centers. Case studies of successful migrations would be of immense help to those needing to undertake a migration. The mapping of the current workflow in order to better plan the migration is an important topic that is only sparsely addressed in the current literature and thus should be explored in future studies.

Physician practice groups should create policies and procedures to facilitate the standardization of the transition from paper to electronic systems. Staff training plans need to be addressed. Time must be set aside to establish a legal health record steering committee to manage these issues so that the negative impacts of this reengineering process can be minimized. The Health Information Technology Research Center states that having a committed steering committee in place is critical to implementation success.¹⁴ While the size of the steering committee may vary with location, the Health Information Technology Research Center recommends an interdepartmental team consisting of three or more members. This team could include senior leaders from the health information management, quality management, nursing, admitting, pharmacy, lab, radiology, and information technology departments, as well as managers from the senior leadership team such as the chief executive officer. Furthermore, this team should meet at least once a week, report results to upper management, and have the ability to make key decisions.

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Notes

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Table 1

Web-based Survey Questions

Question
1. Who is responding to this survey? Physician Office Manager Nurse Other (please specify)
2. What is your medical specialty (check all that apply)? General Practice Family Medicine Internal Medicine Pediatrics Obstetrics and Gynecology Allergy and Immunology Dermatology EENT Cardiology Urology Surgery Psychiatry Other (please specify)
3. Approximately how many patients do you see a year?
4. Did you store the paper records? Yes No
5. For which time frame did you migrate the patients' data?
6. Did you migrate the ENTIRE patient record from the legacy paper record? Yes No
7. Which data elements did you migrate from the legacy paper system into the EHR? allergies clinic notes/progress notes consultation reports family history history of present illness imaging reports lab results medications past medical history physical exam reason for visit/chief complaint social history Other diagnostics (please specify)
8. What methodologies were used to migrate the data to the EHR?

Data entry Scanned Both scanned and typed in
9. Did you validate that the legacy data was migrated correctly? Yes No
10. How did you validate that the legacy data was migrated correctly? Visually examined sample of records EHR vendor validated data Software editing program utilized Other (please specify)
11. Is there anything you would do differently with data migration?

Note: EENT stands for ear, eye, nose, and throat.

Table 2

Demographic Characteristics of Survey Respondents

Response Categories	Frequency	Percentage
Physician	20	54.05
Office manager	13	35.14
Nurse	1	2.70
Other (please specify) ^a	3	8.11
Total	37	100.00

^a “Other” responses included information technology (1), medical records director (1), and account manager (1).

Table 3

Data Elements Migrated

Response Categories	Frequency	Percentage
Allergies	10	10.87
Clinic notes/progress notes	6	6.52
Consultation reports	4	4.35
Family history	9	9.78
History of present illness	6	6.52
Imaging reports	8	8.70
Lab results	9	9.78
Medications	10	10.87
Past medical history	9	9.78
Physical exam results	3	3.26
Reason for visit/chief complaint	3	3.26
Review of systems	2	2.17
Social history	7	7.61
Other (please specify) ^a	6	6.52
Total	92	100.00

^a “Other” responses included immunizations and advanced directives (1) and EKGs (5).

Table 4

Methods Used for Data Migration

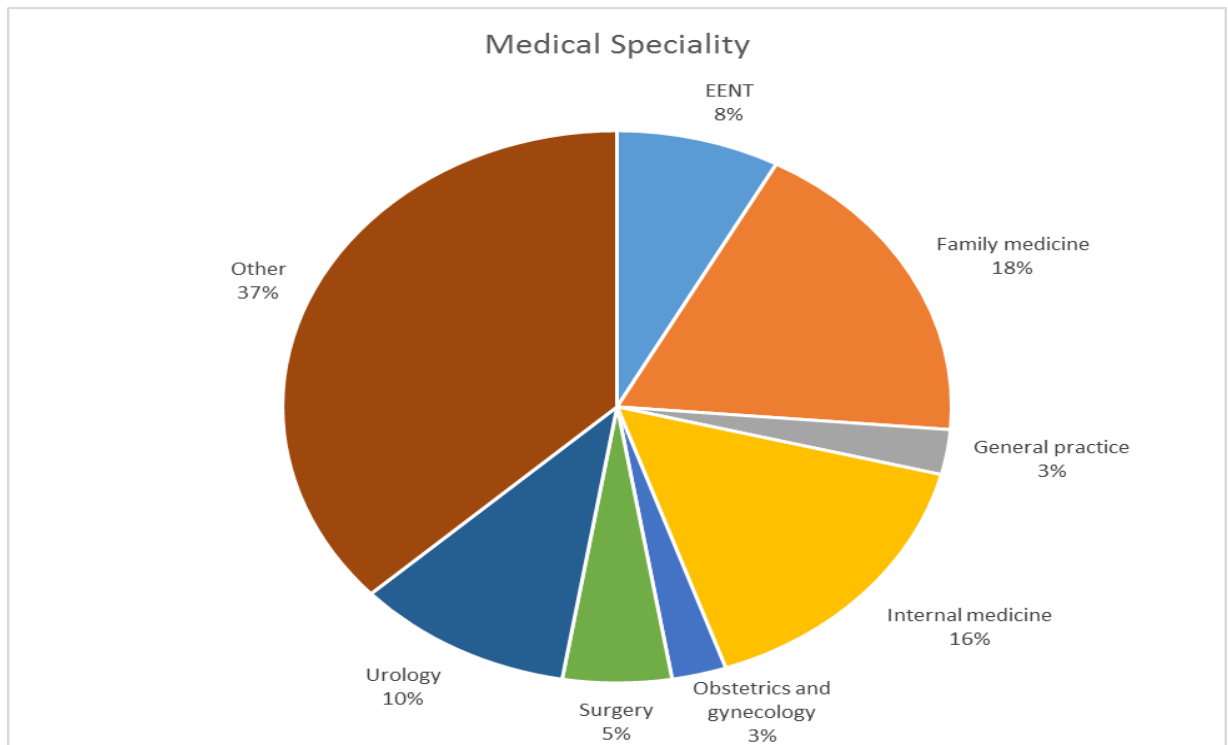
Response Categories	Frequency	Percentage
Data entry	2	6.06
Scanned	8	24.24
Both scanned and typed in	23	69.70
Total	33	100.00

Table 5

Months of Data Migrated

Response Categories	Frequency	Percentage
Entire record migrated	16	50.00
Patients seen in last 6 months	1	3.13
Patients seen in last 12 months	1	3.13
Patients seen in last 18 months	3	9.38
Patients seen in last 24 months	1	3.13
Patient seen less than 36 months ago	1	3.13
Patients seen more than 36 months ago	1	3.13
Point-of-care conversion	8	25.00
Total	32	100

Note: Responses were in answer to the question “For which time frame did you migrate the patients’ data?”

Figure 1**Medical Specialties of Participants**

Notes: The “Other” category includes billing, coding, claims submission, neurology, optometry, optometry–therapeutic, orthopedic surgery, orthopedics, podiatry, and rheumatology. EENT stands for ear, eye, nose, and throat.

Figure 2

Number of Patients Seen in a Year

